

AD-A250 628



WRDC-TR-90-8007
Volume V
Part 45



INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume V - Common Data Model Subsystem
Part 45 - CDM Compare Utility User's Manual

M. Apicella, S. Singh

Control Data Corporation
Integration Technology Services
2970 Presidential Drive
Fairborn, OH 45324-6209



September 1990

Final Report for Period 1 April 1987 - 31 December 1990

Approved for Public Release; Distribution is Unlimited

MANUFACTURING TECHNOLOGY DIRECTORATE
WRIGHT RESEARCH AND DEVELOPMENT CENTER
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6533

92-13651

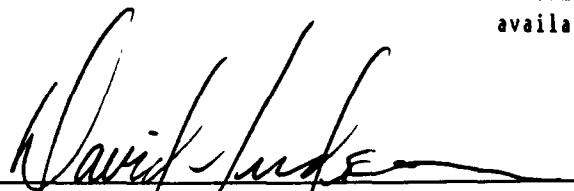
92 5 21 106

NOTICE

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, regardless whether or not the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data. It should not, therefore, be construed or implied by any person, persons, or organization that the Government is licensing or conveying any rights or permission to manufacture, use, or market any patented invention that may in any way be related thereto.

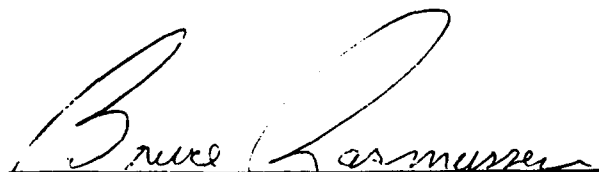
This technical report has been reviewed and is approved for publication.

This report is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations


DAVID L. JUDSON, Project Manager
WRDC/MTI
Wright-Patterson AFB, OH 45433-6533

25 July 91
DATE

FOR THE COMMANDER:


BRUCE A. RASMUSSEN, Chief
WRDC/MTI
Wright-Patterson AFB, OH 45433-6533

25 July 91
DATE

If your address has changed, if you wish to be removed from our mailing list, or if the addressee is no longer employed by your organization please notify WRDC/MTI, Wright-Patterson Air Force Base, OH 45433-6533 to help us maintain a current mailing list.

Copies of this report should not be returned unless return is required by security considerations, contractual obligations, or notice on a specific document.

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for Public Release; Distribution is Unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S) UM 620341430		5. MONITORING ORGANIZATION REPORT NUMBER(S) WRDC-TR-90-8007 Vol. V, Part 45	
6a. NAME OF PERFORMING ORGANIZATION Control Data Corporation; Integration Technology Services	6b. OFFICE SYMBOL (if applicable)	7a. NAME OF MONITORING ORGANIZATION WRDC/MTI	
6c. ADDRESS (City, State, and ZIP Code) 2970 Presidential Drive Fairborn, OH 45324-6209		7b. ADDRESS (City, State, and ZIP Code) WPAFB, OH 45433-6533	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Wright Research and Development Center, Air Force Systems Command, USAF	8b. OFFICE SYMBOL (if applicable) WRDC/MTI	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUM. F33600-87-C-0464	
8c. ADDRESS (City, State, and ZIP Code) Wright-Patterson AFB, Ohio 45433-6533		10. SOURCE OF FUNDING NOS.	
9. TITLE (Include Security Classification) See block 19		PROGRAM ELEMENT NO. 78011F	PROJECT NO. 595600
		TASK NO. F95600	WORK UNIT NO. 20950607
12. PERSONAL AUTHOR(S) Control Data Corporation: Apicella, M. L., Singh, S.			
13a. TYPE OF REPORT Final Report	13b. TIME COVERED 4 / 1 / 87 - 12 / 31 / 90	14. DATE OF REPORT (Yr., Mo., Day) 1990 September 30	15. PAGE COUNT 15
16. SUPPLEMENTARY NOTES WRDC/MTI Project Priority 6203			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify block no.)	
FIELD	GROUP	SUB GR.	
1308	0905		
19. ABSTRACT (Continue on reverse if necessary and identify block number)			
This document provides the methodology and test scripts for testing the performance and functionality of the Common Data Model (CDM) Compare Utility.			
BLOCK 11:			
INTEGRATED INFORMATION SUPPORT SYSTEM			
Vol V - Common Data Model Subsystem			
Part 45 - CDM Compare Utility User's Manual			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED x SAME AS RPT. DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL David L. Judson		22b. TELEPHONE NO. (Include Area Code) (513) 255-7371	22c. OFFICE SYMBOL WRDC/MTI

EDITION OF 1 JAN 73 IS OBSOLETE

DD FORM 1473, 83 APR

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

FOREWORD

This technical report covers work performed under Air Force Contract F33600-87-C-0464, DAPro Project. This contract is sponsored by the Manufacturing Technology Directorate, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Bruce A. Rasmussen, Branch Chief, Integration Technology Division, Manufacturing Technology Directorate, through Mr. David L. Judson, Project Manager. The Prime Contractor was Integration Technology Services, Software Programs Division, of the Control Data Corporation, Dayton, Ohio, under the direction of Mr. W. A. Osborne. The DAPro Project Manager for Control Data Corporation was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test, and demonstration of the Integrated Information Support System (IISS). The IISS technology work comprises enhancements to IISS software and the establishment and operation of IISS test bed hardware and communications for developers and users.

The following list names the Control Data Corporation subcontractors and their contributing activities:

<u>SUBCONTRACTOR</u>	<u>ROLE</u>
Control Data Corporation	Responsible for the overall Common Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.



Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

Structural Dynamics
Research Corporation

Responsible for User Interfaces,
Virtual Terminal Interface, and Network
Transaction Manager design,
development, implementation, and
support.

Arizona State University

Responsible for test bed operations
and support.

TABLE OF CONTENTS

	<u>Page</u>
SECTION 1. INTRODUCTION	1-1
SECTION 2. DOCUMENTS	2-1
2.1 Reference Documents	2-1
2.2 Terms and Abbreviations	2-1
SECTION 3. USING THE CDM COMPARE UTILITY	3-1
3.1 The Extract Phase	3-1
3.1.1 Extract Phase Input	3-1
3.1.2 Extract Phase Output	3-2
3.2 The Compare Phase	3-2
3.2.1 Compare Phase Input	3-3
3.2.2 Compare Phase Output	3-4
3.3 The Report Phase	3-4
3.3.1 Report Phase Input	3-4
3.3.2 Report Phase Output	3-5

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
3-1	Extract Phase Block Diagram	3-1
3-2	Extract Phase Input Screen	3-2
3-3	Compare Phase Block Diagram	3-3
3-4	Compare Phase Input Screen	3-3
3-5	Report Phase Block Diagram	3-4
3-6	IISS Function Screen Used as Report Phase Input Screen	3-4
3-7	Report Phase Output Display	3-5
3-8	Example Report Phase Output Display	3-6

SECTION 1

INTRODUCTION

CDM Compare is a utility used to compare two versions of a CDM and report differences in the internal, conceptual and external schemas as well as the conceptual-internal, conceptual-external and complex schema mappings.

The CDM Compare utility is composed of three parts or phases:

- o Extract Phase - obtains the pertinent information from a CDM and saves the information in a file. This data extraction must be done for each version of the CDM.
- o Compare Phase - performs a comparison of the information obtained from the extract phase and saves the results in a table.
- o Report Phase - displays the results of the comparison.

The CDM Compare utility queries the database tables of the CDM and presents its report to a terminal, a file, or a hardcopy device. Neutral Data Manipulation Language (NDML) is used to obtain the required information from the CDM during the extract phase. You must have access privileges to the IISS environments containing the CDM versions to be compared.

Intended Audience

This document is intended to be used by CDM administrators (CDMA), those who are responsible for making changes to the CDM and ensuring it remains in a consistent state.

SECTION 2

DOCUMENTS

2.1 Reference Documents

- [1] ICAM Documentation Standards, IDS150120000C, 15 September 1983.
- [2] D.Appleton Company, CDM Administrator's Manual, UM 620341000, 31 March 1988.
- [3] D.Appleton Company, CDM1, An IDEF1 Model of the Common Data Model, CCS620141000, 15 May 1985.
- [4] Control Data Corporation, Neutral Data Definition Language User's Guide, 31 March 1988.
- [5] C. J. Date, An Introduction to Database Systems, Addison-Wesley Publishing Company, Inc, 1977.
- [6] IBM, DATABASE 2 Reference release 1.0, IBM, December 1984.
- [7] Cincom Systems, TOTAL Database Administration Reference Manual, release 8.1 1978, Cincom Systems.

2.2 Terms and Abbreviations

Application Process: (AP), a cohesive unit of software that can be initiated as a unit to perform some function or functions.

Common Data: (CD), all the data of an enterprise.

Common Data Model: (CDM), IISS subsystem that describes common data of an enterprise and includes conceptual, external and internal schemas and schema transformation operators.

Common Data Model Administrator: (CDMA), the person or group of persons responsible for creating and maintaining an enterprises's Common Data Model. The CDMA manages the common data rather than managing applications that access data.

Common Data Model Processor: (CDMP), a component of the Common Data Model subsystem which is the distributed database manager of the IISS.

Conceptual Schema: (CS), the standard definition used for all data in the enterprise. It is based on IDEF1 information modelling.

External Schema: (ES), an application's view of the CDM's conceptual schema.

Integrated Information Support System: (IISS), a computing environment used to investigate, demonstrate, test the concepts and produce application for information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous data bases supported by heterogeneous computers interconnected via a Local Area Network.

Internal Schema: (IS), the definition of the internal model, the storage structure definition, which specifies how the physical data are stored and how they can be accessed. It is represented in terms of the physical database components, including record types and inter-record relationships.

Neutral Data Definition Language: (NDDL), a language used to manipulate and populate information in the Common Data Model (CDM) or IISS System Database.

Neutral Data Manipulation Language: (NDML), a language developed by the IISS project to provide uniform access to common data, regardless of database manager or distribution criteria. It provides distributed retrieval and single node update.

Presentation Schema: (PS), the totality of the form fields in an application which are targets of data derivative from the common data.

SECTION 3

USING THE CDM COMPARE UTILITY

The CDM Compare is a software utility available in the IISS environment. The programs which comprise the utility consist of functions which compare one version of a CDM with another version of the CDM and report the results of the comparison. The CDM Compare consists of three phases which are executed from the IISS Function Screen as separate applications.

The following sections explain how to execute each phase.

3.1 The Extract Phase

The Extract Phase is accessed through the IISS Function Screen. At this step you specify the schemas and mappings to be compared and the name of the output data file. You must execute an extraction separately for each version of the CDM that you want to compare. The result of each extraction is a data file. The result of the Extract Phase will be two data files, one for each CDM to be compared.

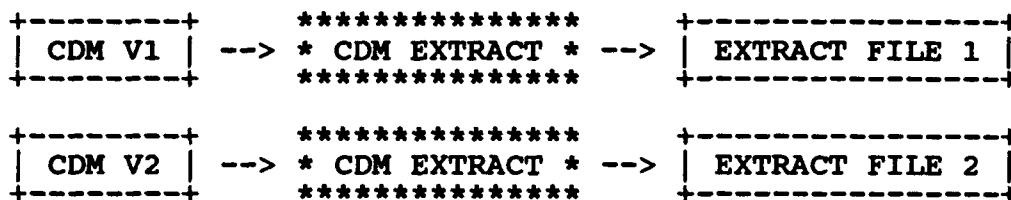


Figure 3-1 Extract Phase Block Diagram

3.1.1 Extract Phase Input

You access the Extract Phase by entering "CDMXTRCT" in the Function field on the IISS Function Screen. Figure 3-2 shows the input screen that is then displayed.

```
-----+-----
              INTEGRATED INFORMATION SUPPORT SYSTEM

              CDM COMPARE UTILITY

              **  EXTRACT PHASE  **

CDM Version Identifier: _____

Output Data File Name: _____

      Place an "X" by each object to be compared
      and press <enter> when your selections are
      complete.

    _Internal Schema      _Conceptual-Internal Schema Mappings
    _Conceptual Schema    _Conceptual-External Schema Mappings
    _External Schema      _Complex Mapping

Msg: 0                                                              application
-----+-----
```

Figure 3-2 Extract Phase Input Screen

The CDM Version Identifier field is a one to ten character field that you fill in to identify the CDM during the comparison process. The Output Data File Name field is a one to forty character field that you fill in to name the output data file. Both fields accept the characters A-Z, and the numbers 0-9 as long as the contents of the field starts with an alphabetic character. You select the objects to be compared by placing an "X" by the desired objects. You may select one comparison or as many as six comparisons at a time. When you press the <ENTER> key, a message is displayed in the message field (at the bottom of the screen) telling you which extraction is being performed. When the extraction is complete, the IISS Function Screen is displayed with a completion message in the message field. At this time you can execute another extraction or continue with the Compare Phase of the utility.

3.1.2 Extract Phase Output

The Extract Phase creates an output data file with the name you specify on the input screen. This file is used as input to the Compare Phase of this utility. A description of the record layout for this file is contained in Appendix A.

3.2 The Compare Phase

The Compare Phase is also accessed through the IISS Function Screen. In this phase you must specify the names of the files containing the results of the Extract Phase operation.

This part of the CDM Compare utility performs a comparison of the two files created during the Extract Phase. The output from the compare populates a table named Compare Results, which resides in the CDM data base. This table contains all the results of the compare.



Figure 3-3 Compare Phase Block Diagram

3.2.1 Compare Phase Input

You access the Compare Phase by entering "CDMCMPAR" in the Function field on the IISS Function Screen. Figure 3-4 shows the input screen that is then displayed.

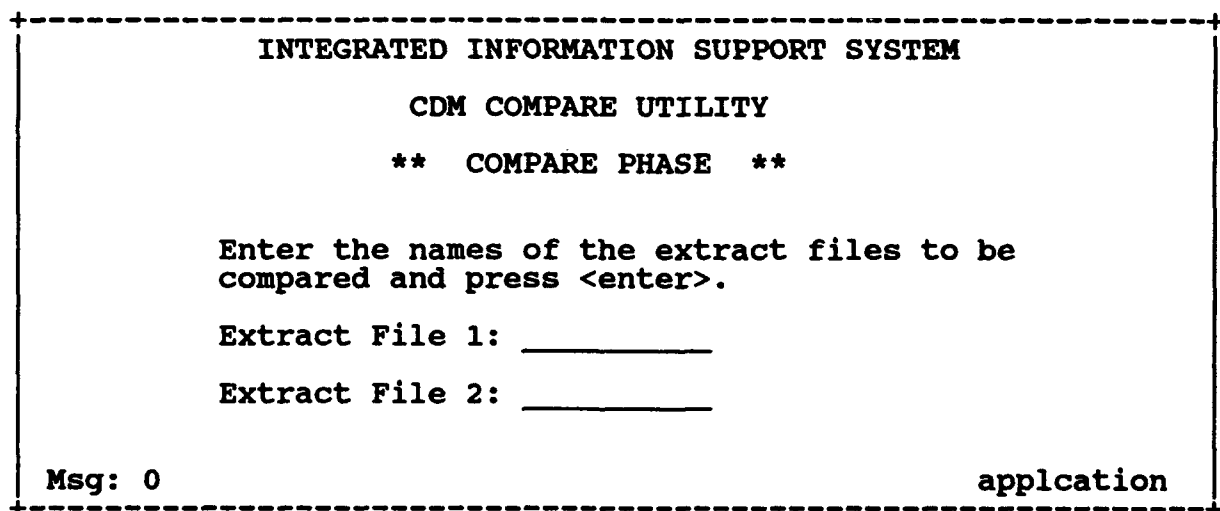


Figure 3-4 Compare Phase Input Screen

Input the names of the two extract files to be compared in the fields marked Extract File 1 and Extract File 2. The data files extracted from CDM 1 and CDM 2 correspond to the files: Extract File 1 and Extract File 2 respectively. The names of the two files may be one to forty characters long and can be comprised of alphanumeric characters as long as the first character is an alphabetic character. The extract files are sorted and compared with the differences identified and placed in the Compare Results table.

3.2.2 Compare Phase Output

The output from the Compare Phase populates the table Compare_Results. The data which go into the table are: CDM version, schema id, category, level, item data and description of the difference for this item data occurrence. The Compare_Results table must be created prior to using the CDM Compare utility the first time. Appendix B contains the NDDL statements necessary to define this table to the CDM.

3.3 The Report Phase

The Report Phase retrieves the comparison results from the Compare Results table and outputs the results to any appropriate output device supported by the User Interface Management System.



Figure 3-5 Report Phase Block Diagram

3.3.1 Report Phase Input

The Report Phase is accessed through the IISS Function screen. The report program is accessed by entering "CDMRRPRT" in the Function field. If the report is to be displayed on the terminal, leave the other fields on the screen blank. If the report is to go to a disk file or hardcopy device, then "SDPRINTERZ" must be entered as the Device Type and the appropriate device name or file name must be entered in the Device Name field. The IISS Function Screen is shown in Figure 3-6.

```

+-----+
|          IISS      TEST      BED      VERSION      2.2          |
+-----+
| DATE: 6/27/86  TIME: 11:00:35  USER ID: myname  ROLE: manager  |
|                                                                    |
| FUNCTION: CDMRRPRT  DEVICE TYPE: SDPRINTERZ  DEVICE NAME: <NAME> |
|                                                                    |
|                                                                    |
|                                                                    |
| Msg: 0                                                    application |
+-----+

```

Figure 3-6 IISS Function Screen Used as Report Phase Input Screen

3.3.2 Report Phase Output

The results report is presented as shown in Figure 3-7.

```
+-----+
|                                     |
|               CDM COMPARE REPORT   |
|               <Schema or mapping>  |
|               <Category> - <Level> |
|                                     |
|   Item: model_name.ec_name.ac_name1 |
|   Reason: not defined for CDM 2     |
|                                     |
|   Item : model_name.ec_name.ac_name2 |
|   Reason: definition different for CDM 2 |
|                                     |
|   Msg: 0                               application   |
+-----+
```

Figure 3-7 Report Phase Output Display

The report produced during this phase has the format displayed in Figure 3-7. The schema or mapping is displayed at the top of the page. The category and level appear as the second line of the report. The category and level together uniquely identifies the part of the schema/mapping that is different. The item field names the command data definitions that are different. The reason field has two possible statements:

- o not defined for
- o definition different for

Appendix A contains more information concerning this hierarchy (category.level.item) and Appendix C shows which item type corresponds to the item name given in the above report (such as the one depicted above).

Figure 3-8 is an example of what one page of a report might be.

CDM COMPARE REPORT	
Conceptual Schema	
Entity-Class - Owned Attributes	
Item: integrated_model.attribute_class.attribute_class_key	
Reason: definition different for my_cdm	
Item: integrated_model.data_field_filler.df_filler_key	
Reason: not defined for your_cdm	
Msg: 0	application

Figure 3-8 Example Report Phase Output Display